

ABSTRACT OF THE DISCLOSURE

An organ perfusion apparatus and method monitor, sustain and/or restore viability of organs and preserve organs for storage and/or transport. The method includes perfusing the organ at hypothermic and/or normothermic temperatures, 5 preferably after hypothermic organ flushing for organ transport and/or storage. The method can be practiced with prior or subsequent static or perfusion hypothermic exposure of the organ. Organ viability is restored by restoring high energy nucleotide (e.g., ATP) levels by perfusing the organ with a medical fluid, such as an oxygenated cross-linked hemoglobin-based bicarbonate medical fluid, at normothermic 10 temperatures. In perfusion, organ perfusion pressure is preferably controlled in response to a sensor disposed in an end of tubing placed in the organ, by a pneumatically pressurized medical fluid reservoir, providing perfusion pressure fine tuning, overpressurization prevention and emergency flow cut-off. In the hypothermic mode, the organ is perfused with a medical fluid, preferably a simple 15 crystalloid solution containing antioxidants, intermittently or in slow continuous flow. The medical fluid may be fed into the organ from an intermediary tank having a low pressure head to avoid organ overpressurization. Preventing overpressurization prevents or reduces damage to vascular endothelial lining and to organ tissue in general. Viability of the organ may be automatically monitored, preferably by 20 monitoring characteristics of the medical fluid perfusate. The perfusion process can be automatically controlled using a control program.